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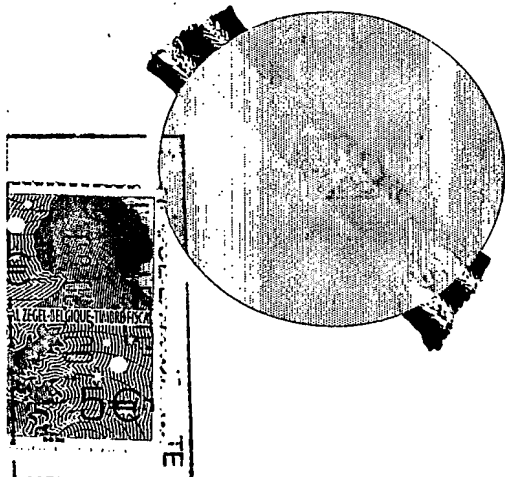
Bruxelles, le -9. -8- 2004

Pour le Conseiller de l'Office  
de la Propriété industrielle

Le fonctionnaire délégué,

PETIT M.  
Conseiller adjoint

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# PCT

## REQUEST

The undersigned requests that the present international application be processed according to the Patent Cooperation Treaty.

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PC T / B E 0 3 / 0 0 1 6 2

International Application No.

26 SEP 2003

International Filing Date

(26-09-2003)

RO/BE - INTERNATIONAL APPLICATION

Name of receiving Office and "PCT International Application"

Applicant's or agent's file reference  
(if desired) (12 characters maximum) ORPC 135.435/ MJ

**Box No. I TITLE OF INVENTION**

Low-trans fats for confectionery fat compositions

**Box No. II APPLICANT**

☐ This person is also inventor

Name and address: (Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country. The country of the address indicated in this Box is the applicant's State (that is, country) of residence if no State of residence is indicated below.)

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Facsimile No.

Teleprinter No.

Applicant's registration No. with the Office

State (that is, country) of nationality:

BE

State (that is, country) of residence:

BE

This person is applicant  
for the purposes of:

☐ all designated  
States

☒ all designated States except  
the United States of America

☐ the United States  
of America only

☐ the States indicated in  
the Supplemental Box

**Box No. III FURTHER APPLICANT(S) AND/OR (FURTHER) INVENTOR(S)**

Name and address: (Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country. The country of the address indicated in this Box is the applicant's State (that is, country) of residence if no State of residence is indicated below.)

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This person is:

☐ applicant only

☒ applicant and inventor

☐ inventor only (If this check-box  
is marked, do not fill in below.)

Applicant's registration No. with the Office

State (that is, country) of nationality:

BE

State (that is, country) of residence:

BE

This person is applicant  
for the purposes of:

☐ all designated  
States

☐ all designated States except  
the United States of America

☒ the United States  
of America only

☐ the States indicated in  
the Supplemental Box

☐ Further applicants and/or (further) inventors are indicated on a continuation sheet.

**Box No. IV AGENT OR COMMON REPRESENTATIVE; OR ADDRESS FOR CORRESPONDENCE**

The person identified below is hereby/has been appointed to act on behalf of the applicant(s) before the competent International Authorities as:

☒ agent

☐ common  
representative

Name and address: (Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country.)

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☐ Address for correspondence: Mark this check-box where no agent or common representative is/has been appointed and the space above is used instead to indicate a special address to which correspondence should be sent.

# CONFIRMATION COPY

## Box No. V DESIGNATION OF STATES

Mark the applicable check-boxes below; at least one must be marked.

The following designations are hereby made under Rule 4.9(a):

## Regional Patent

- ☒ AP ARIPO Patent: GH Ghana, GM Gambia, KE Kenya, LS Lesotho, MW Malawi, MZ Mozambique, SD Sudan, SL Sierra Leone, SZ Swaziland, TZ United Republic of Tanzania, UG Uganda, ZM Zambia, ZW Zimbabwe, and any other State which is a Contracting State of the Harare Protocol and of the PCT (if other kind of protection or treatment desired, specify on dotted line) and utility model
- ☒ EA Eurasian Patent: AM Armenia, AZ Azerbaijan, BY Belarus, KG Kyrgyzstan, KZ Kazakhstan, MD Republic of Moldova, RU Russian Federation, TJ Tajikistan, TM Turkmenistan, and any other State which is a Contracting State of the Eurasian Patent Convention and of the PCT
- ☒ EP European Patent: AT Austria, BE Belgium, BG Bulgaria, CH & LI Switzerland and Liechtenstein, CY Cyprus, CZ Czech Republic, DE Germany, DK Denmark, EE Estonia, ES Spain, FI Finland, FR France, GB United Kingdom, GR Greece, HU Hungary, IE Ireland, IT Italy, LU Luxembourg, MC Monaco, NL Netherlands, PT Portugal, RO Romania, SE Sweden, SI Slovenia, SK Slovakia, TR Turkey, and any other State which is a Contracting State of the European Patent Convention and of the PCT
- ☒ OA OAPI Patent: BF Burkina Faso, BJ Benin, CF Central African Republic, CG Congo, CI Côte d'Ivoire, CM Cameroon, GA Gabon, GN Guinea, GQ Equatorial Guinea, GW Guinea-Bissau, ML Mali, MR Mauritania, NE Niger, SN Senegal, TD Chad, TG Togo, and any other State which is a member State of OAPI and a Contracting State of the PCT (if other kind of protection or treatment desired, specify on dotted line)

## National Patent (if other kind of protection or treatment desired, specify on dotted line):

- |   |  |   |
|---|--|---|
| <input checked="" type="checkbox"/> AE United Arab Emirates               | <input checked="" type="checkbox"/> HR Croatia                                   | <input checked="" type="checkbox"/> OM Oman                             |
| <input checked="" type="checkbox"/> AG Antigua and Barbuda                | <input checked="" type="checkbox"/> HU Hungary                                   | <input checked="" type="checkbox"/> PG Papua New Guinea                 |
| <input checked="" type="checkbox"/> AL Albania                            | <input checked="" type="checkbox"/> ID Indonesia                                 | <input checked="" type="checkbox"/> PH Philippines                      |
| <input checked="" type="checkbox"/> AM Armenia                            | <input checked="" type="checkbox"/> IL Israel                                    | <input checked="" type="checkbox"/> PL Poland                           |
| <input checked="" type="checkbox"/> AT Austria and utility model          | <input checked="" type="checkbox"/> IN India                                     | <input checked="" type="checkbox"/> PT Portugal                         |
| <input checked="" type="checkbox"/> AU Australia                          | <input checked="" type="checkbox"/> IS Iceland                                   | <input checked="" type="checkbox"/> RO Romania                          |
| <input checked="" type="checkbox"/> AZ Azerbaijan                         | <input checked="" type="checkbox"/> JP Japan                                     | <input checked="" type="checkbox"/> RU Russian Federation               |
| <input checked="" type="checkbox"/> BA Bosnia and Herzegovina             | <input checked="" type="checkbox"/> KE Kenya                                     |   |
| <input checked="" type="checkbox"/> BB Barbados                           | <input checked="" type="checkbox"/> KG Kyrgyzstan                                | <input checked="" type="checkbox"/> SC Seychelles                       |
| <input checked="" type="checkbox"/> BG Bulgaria                           | <input checked="" type="checkbox"/> KP Democratic People's Republic of Korea     | <input checked="" type="checkbox"/> SD Sudan                            |
| <input checked="" type="checkbox"/> BR Brazil                             | <input checked="" type="checkbox"/> KR Republic of Korea                         | <input checked="" type="checkbox"/> SE Sweden                           |
| <input checked="" type="checkbox"/> BY Belarus                            | <input checked="" type="checkbox"/> KZ Kazakhstan                                | <input checked="" type="checkbox"/> SG Singapore                        |
| <input checked="" type="checkbox"/> BZ Belize                             | <input checked="" type="checkbox"/> LC Saint Lucia                               | <input checked="" type="checkbox"/> SK Slovakia and utility model       |
| <input checked="" type="checkbox"/> CA Canada                             | <input checked="" type="checkbox"/> LK Sri Lanka                                 | <input checked="" type="checkbox"/> SL Sierra Leone                     |
| <input checked="" type="checkbox"/> CH & LI Switzerland and Liechtenstein | <input checked="" type="checkbox"/> LR Liberia                                   | <input checked="" type="checkbox"/> SY Syrian Arab Republic             |
| <input checked="" type="checkbox"/> CN China                              | <input checked="" type="checkbox"/> LT Lithuania                                 | <input checked="" type="checkbox"/> TJ Tajikistan                       |
| <input checked="" type="checkbox"/> CO Colombia                           | <input checked="" type="checkbox"/> LU Luxembourg                                | <input checked="" type="checkbox"/> TM Turkmenistan                     |
| <input checked="" type="checkbox"/> CR Costa Rica                         | <input checked="" type="checkbox"/> LV Latvia                                    | <input checked="" type="checkbox"/> TN Tunisia                          |
| <input checked="" type="checkbox"/> CU Cuba                               | <input checked="" type="checkbox"/> MA Morocco                                   | <input checked="" type="checkbox"/> TR Turkey                           |
| <input checked="" type="checkbox"/> CZ Czech Republic and utility model   | <input checked="" type="checkbox"/> MD Republic of Moldova                       | <input checked="" type="checkbox"/> TT Trinidad and Tobago              |
| <input checked="" type="checkbox"/> DE Germany and utility model          | <input checked="" type="checkbox"/> MG Madagascar                                |   |
| <input checked="" type="checkbox"/> DK Denmark and utility model          | <input checked="" type="checkbox"/> MK The former Yugoslav Republic of Macedonia | <input checked="" type="checkbox"/> TZ United Republic of Tanzania      |
| <input checked="" type="checkbox"/> DM Dominica                           | <input checked="" type="checkbox"/> MN Mongolia                                  | <input checked="" type="checkbox"/> UA Ukraine                          |
| <input checked="" type="checkbox"/> DZ Algeria                            | <input checked="" type="checkbox"/> MW Malawi                                    | <input checked="" type="checkbox"/> UG Uganda                           |
| <input checked="" type="checkbox"/> EC Ecuador                            | <input checked="" type="checkbox"/> MX Mexico                                    | <input checked="" type="checkbox"/> US United States of America         |
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| <input checked="" type="checkbox"/> ES Spain                              | <input checked="" type="checkbox"/> NI Nicaragua                                 | <input checked="" type="checkbox"/> UZ Uzbekistan                       |
| <input checked="" type="checkbox"/> FI Finland and utility model          | <input checked="" type="checkbox"/> NO Norway                                    | <input checked="" type="checkbox"/> VC Saint Vincent and the Grenadines |
| <input checked="" type="checkbox"/> GB United Kingdom                     | <input checked="" type="checkbox"/> NZ New Zealand                               | <input checked="" type="checkbox"/> VN Viet Nam                         |
| <input checked="" type="checkbox"/> GD Grenada                            |  | <input checked="" type="checkbox"/> YU Serbia and Montenegro            |
| <input checked="" type="checkbox"/> GE Georgia                            |  | <input checked="" type="checkbox"/> ZA South Africa                     |
| <input checked="" type="checkbox"/> GH Ghana                              |  | <input checked="" type="checkbox"/> ZM Zambia                           |
| <input checked="" type="checkbox"/> GM Gambia                             |  | <input checked="" type="checkbox"/> ZW Zimbabwe                         |

Check-boxes below reserved for designating States which have become party to the PCT after issuance of this sheet:

- ☒ Egypt ☐ ☐

**Precautionary Designation Statement:** In addition to the designations made above, the applicant also makes under Rule 4.9(b) all other designations which would be permitted under the PCT except any designation(s) indicated in the Supplemental Box as being excluded from the scope of this statement. The applicant declares that those additional designations are subject to confirmation and that any designation which is not confirmed before the expiration of 15 months from the priority date is to be regarded as withdrawn by the applicant at the expiration of that time limit. (Confirmation (including fees) must reach the receiving Office within the 15-month time limit.)

## Supplemental Box

*If the Supplemental Box is not used, this sheet should not be included in the request.*

1. If, in any of the Boxes, except Boxes Nos. VIII(i) to (v) for which a special continuation box is provided, the space is insufficient to furnish all the information: in such case, write "Continuation of Box No. ...." (indicate the number of the Box) and furnish the information in the same manner as required according to the captions of the Box in which the space was insufficient, in particular:

(i) if more than two persons are to be indicated as applicants and/or inventors and no "continuation sheet" is available: in such case, write "Continuation of Box No. III" and indicate for each additional person the same type of information as required in Box No. III. The country of the address indicated in this Box is the applicant's State (that is, country) of residence if no State of residence is indicated below;

(ii) if, in Box No. II or in any of the sub-boxes of Box No. III, the indication "the States indicated in the Supplemental Box" is checked: in such case, write "Continuation of Box No. II" or "Continuation of Box No. III" or "Continuation of Boxes No. II and No. III" (as the case may be), indicate the name of the applicant(s) involved and, next to (each) such name, the State(s) (and/or, where applicable, ARIPO, Eurasian, European or OAPI patent) for the purposes of which the named person is applicant;

(iii) if, in Box No. II or in any of the sub-boxes of Box No. III, the inventor or the inventor/applicant is not inventor for the purposes of all designated States or for the purposes of the United States of America: in such case, write "Continuation of Box No. II" or "Continuation of Box No. III" or "Continuation of Boxes No. II and No. III" (as the case may be), indicate the name of the inventor(s) and, next to (each) such name, the State(s) (and/or, where applicable, ARIPO, Eurasian, European or OAPI patent) for the purposes of which the named person is inventor;

(iv) if, in addition to the agent(s) indicated in Box No. IV, there are further agents: in such case, write "Continuation of Box No. IV" and indicate for each further agent the same type of information as required in Box No. IV;

(v) if, in Box No. V, the name of any State (or OAPI) is accompanied by the indication "patent of addition," or "certificate of addition," or if, in Box No. V, the name of the United States of America is accompanied by an indication "continuation" or "continuation-in-part": in such case, write "Continuation of Box No. V" and the name of each State involved (or OAPI), and after the name of each such State (or OAPI), the number of the parent title or parent application and the date of grant of the parent title or filing of the parent application;

(vi) if, in Box No. VI, there are more than five earlier applications whose priority is claimed: in such case, write "Continuation of Box No. VI" and indicate for each additional earlier application the same type of information as required in Box No. VI.

2. If, with regard to the precautionary designation statement contained in Box No. V, the applicant wishes to exclude any State(s) from the scope of that statement: in such case, write "Designation(s) excluded from precautionary designation statement" and indicate the name or two-letter code of each State so excluded.

# CONTINUATION OF BOX IV ADDITIONAL AGENTS :

Claeys Pierre, Gevers Florent, Gevers François,  
Gevers Jacques, Grisar Daniel, Luys Marie-José,  
Pieraerts Jacques, Quintelier Claude, Rossini -de  
Taxis du Poët Dominique, Schmitz Yvon, Van Reet  
Joseph, Vosswinkel Philippe

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**Box No. VI PRIORITY CLAIM**

The priority of the following earlier application(s) is hereby claimed:

Filing date of earlier application (day/month/year)	Number of earlier application	Where earlier application is:		
		national application: country or Member of WTO	regional application:* regional Office	international application: receiving Office
item (1)				
item (2)				
item (3)				
item (4)				
item (5)				

☐ Further priority claims are indicated in the Supplemental Box.

The receiving Office is requested to prepare and transmit to the International Bureau a certified copy of the earlier application(s) (only if the earlier application was filed with the Office which for the purposes of this international application is the receiving Office) identified above as:

☐ all items   
 ☐ item (1)   
 ☐ item (2)   
 ☐ item (3)   
 ☐ item (4)   
 ☐ item (5)   
 ☐ other, see Supplemental Box

\* Where the earlier application is an ARIPO application, indicate at least one country party to the Paris Convention for the Protection of Industrial Property or one Member of the World Trade Organization for which that earlier application was filed (Rule 4.10(b)(ii)): ....

**Box No. VII INTERNATIONAL SEARCHING AUTHORITY**

Choice of International Searching Authority (ISA) (if two or more International Searching Authorities are competent to carry out the international search, indicate the Authority chosen; the two-letter code may be used):

ISA / .....

Request to use results of earlier search; reference to that search (if an earlier search has been carried out by or requested from the International Searching Authority):

Date (day/month/year)                      Number                      Country (or regional Office)

**Box No. VIII DECLARATIONS**

The following declarations are contained in Boxes Nos. VIII (i) to (v) (mark the applicable check-boxes below and indicate in the right column the number of each type of declaration):

		Number of declarations
<input type="checkbox"/> Box No. VIII (i)	Declaration as to the identity of the inventor	:
<input type="checkbox"/> Box No. VIII (ii)	Declaration as to the applicant's entitlement, as at the international filing date, to apply for and be granted a patent	:
<input type="checkbox"/> Box No. VIII (iii) -	Declaration as to the applicant's entitlement, as at the international filing date, to claim the priority of the earlier application	:
<input type="checkbox"/> Box No. VIII (iv)	Declaration of inventorship (only for the purposes of the designation of the United States of America)	:
<input type="checkbox"/> Box No. VIII (v)	Declaration as to non-prejudicial disclosures or exceptions to lack of novelty	:

## Box No. IX CHECK LIST; LANGUAGE OF FILING

This international application contains:

(a) in paper form, the following number of sheets:

request (including declaration sheets) : 5  
 description (excluding sequence listings and/or tables related thereto) : 23  
 claims : 3  
 abstract : 1  
 drawings :

Sub-total number of sheets : 32

sequence listings :  
tables related thereto :

(for both, actual number of sheets if filed in paper form, whether or not also filed in computer readable form; see (c) below)

Total number of sheets : 32

(b) ☐ only in computer readable form (Section 801(a)(i))(i) ☐ sequence listings(ii) ☐ tables related thereto(c) ☐ also in computer readable form (Section 801(a)(ii))(i) ☐ sequence listings(ii) ☐ tables related thereto

Type and number of carriers (diskette, CD-ROM, CD-R or other) on which are contained the

☐ sequence listings: .....☐ tables related thereto: .....

(additional copies to be indicated under items 9(ii) and/or 10(ii), in right column)

This international application is accompanied by the following item(s) (mark the applicable check-boxes below and indicate in right column the number of each item):

Number of items

1. ☒ fee calculation sheet : 1
2. ☐ original separate power of attorney :
3. ☐ original general power of attorney :
4. ☐ copy of general power of attorney; reference number, if any: .....
5. ☐ statement explaining lack of signature :
6. ☐ priority document(s) identified in Box No. VI as item(s): .....
7. ☐ translation of international application into (language): .....
8. ☐ separate indications concerning deposited microorganism or other biological material :
9. ☐ sequence listings in computer readable form (indicate type and number of carriers)
  - (i) ☐ copy submitted for the purposes of international search under Rule 13ter only (and not as part of the international application) :
  - (ii) ☐ (only where check-box (b)(i) or (c)(i) is marked in left column) additional copies including, where applicable, the copy for the purposes of international search under Rule 13ter :
  - (iii) ☐ together with relevant statement as to the identity of the copy or copies with the sequence listings mentioned in left column :
10. ☐ tables in computer readable form related to sequence listings (indicate type and number of carriers)
  - (i) ☐ copy submitted for the purposes of international search under Section 802(b-quater) only (and not as part of the international application) :
  - (ii) ☐ (only where check-box (b)(ii) or (c)(ii) is marked in left column) additional copies including, where applicable, the copy for the purposes of international search under Section 802(b-quater) :
  - (iii) ☐ together with relevant statement as to the identity of the copy or copies with the tables mentioned in left column :
11. ☐ other (specify): .....

Figure of the drawings which should accompany the abstract: —

Language of filing of the international application:

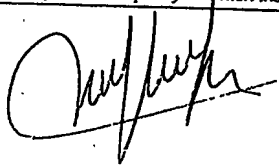
English

## Box No. X SIGNATURE OF APPLICANT, AGENT OR COMMON REPRESENTATIVE

Next to each signature, indicate the name of the person signing and the capacity in which the person signs (if such capacity is not obvious from reading the request).

Antwerp, September 26, 2003

LUYS, Marie-José



For receiving Office use only

1. Date of actual receipt of the purported international application:

26 SEP 2003

26 -09- 2003

3. Corrected date of actual receipt due to later but timely received papers or drawings completing the purported international application:

4. Date of timely receipt of the required corrections under PCT Article 11(2):

5. International Searching Authority (if two or more are competent): ISA /

6. ☐ Transmittal of search copy delayed until search fee is paid

2. Drawings:

☐ received: -☒ not received:

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Date of receipt of the record copy by the International Bureau:

**Low-trans fats for confectionery fat compositions.**

The present invention relates to a process for producing a fat composition suitable for use as confectionery fat, as described in the preamble of the first claim.

5 The present invention also relates to the fat composition as such and to the use of the fat composition in several confectionery applications.

**1. BACKGROUND OF THE INVENTION.****1.1. Filling fats and cream fats.**

10 A first important application area of confectionery fats is the so-called filling and cream fats. Filling and cream fats are used for the production of for example soft centres for pralines or confectionery bars or for creams used in or on biscuits or wafers. To be suitable for use as a cream and/or filling fat, it is important that the fat has specific properties such as good melting properties in the mouth, good creaminess as well as a stable crystal structure. Several types of fats capable of providing these properties are known in the art.

15 A first class of fats suitable for use as filling and/or cream fats includes the so-called lauric fats. The lauric fats are derived from coconut oil or palm kernel oil and contain a high amount of lauric and myristic acid. By subjecting these lauric fats to a fractionation and/or a hydrogenation reaction, a lauric fat with a steep SFC-profile can be obtained, i.e. a lauric fat of which the solid fat content (SFC) as a function of temperature is high at room temperature, whereas at body temperature the solid fat content is low and the fat is completely molten. This sharp transition from solid to liquid gives a cool sensation in the mouth. Besides showing a steep SFC-profile, lauric fats show a quick solidification, which is an advantage when used in fillings and creams. Although they are frequently applied in practise, lauric type fats have a number of disadvantages, a major disadvantage being the risk to saponification of the lauric acid upon ageing, involving the occurrence of a bad taste. Another disadvantage

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25  
30

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of lauric fats is their high saturated fatty acid content, often over 80%, which is considered an important nutritional disadvantage.

5 A second class of cool melting filling and cream fats is based on fractionated palm oil. Palm oil as such shows a rather flat SFC-curve with a SFC at 20°C of only 25 %, while at 35°C the SFC is 6%. By subjecting palm oil to a fractionation process a product with steeper SFC-profile can be obtained. Fractionation of palm oil is carried out by cooling palm oil to a certain temperature, until a liquid phase is obtained containing triglycerides with a the lower melting point, and a solid phase containing triglycerides with a higher melting point. 10 Reduction of the tailing effect of the SFC curve is achieved by removing the high melting part, which mainly consists of trisaturated triglycerides like tripalmitine. Fats associated with this tailing cause a waxy feeling in the mouth upon eating. In a next stage, through removal of the part with the lower melting temperature, which mainly comprises tri- or di-unsaturated triglycerides like tri-oleine or 1-palmitic 2-3-oleic triglycerides, the SFC at room temperature is increased. The 15 fraction remaining after removal of the higher and lower melting part of the palm oil is commonly indicated by the name PMF (palm mid fraction).

The most important advantages of PMF-based filling and cream fats are their non-lauric nature, the lower content of saturated fatty acids, the fresh melting sensation upon eating and the fact that PMF is a non-hydrogenated fat. A major disadvantage of PMF however resides in the rather long 20 and laborious fractionation process involved, together with the rather low production yields, which renders the product expensive: starting from palm oil with most fractionation processes, only 25-30 % of PMF is obtained. The yields of hard PMF obtained via double fractionation are even lower. A further disadvantage is 25 the slow solidification rate of PMF, which necessitates in the confectionery plant the use of devices with high cooling capacities. Besides this, PMF based fats show a risk to re-crystallisation, causing "graininess" of the final product when stored for some time, in particular in case no tempering is applied.

30 A third type of filling and cream fats is based on hydrogenated liquid oils or hydrogenated olein fractions. This type of fat compositions is characterised by a good creaminess and good melting properties, although they may show less cooling sensation in the mouth, which is typical for the two previous types of fat compositions. Products containing these fats show a



quick solidification and a stable texture. In addition to this, hydrogenated liquid oils and olein fractions are less expensive compared to the former products since their raw materials are largely available and their processing is less complicated as compared to fractionation of palm oil.

5                   The presence of trans fatty acids entails the advantage of improving the crystallisation rate of the fat composition containing them. However the often too high trans fatty acids content of hydrogenated liquid oils and olein fractions, has become a health concern, the importance of which is increasing. Although trans fatty acids are unsaturated fatty acids, they have  
10                   undesirable effects comparable to or even worse than saturated fatty acids (SFA). As a consequence, there is an interest to not only control the SFA level of a fat composition, but to control also the sum of the TFA and SFA levels. If it is envisaged to obtain products with steep SFC-profiles, the hydrogenation reaction is mostly carried out in the presence of a trans-specific catalyst, for example S-  
15                   poisoned Ni-catalysts.

                  From the above, it will become clear that there is a need to a fat composition suitable for use as a confectionery fat and to a method for producing such a fat composition. In particular there is a need to a fat composition which preferably is non-lauric, which is characterised by a good  
20                   melting in the mouth without involving waxiness, which shows a sufficiently high crystallisation rate and has an interesting nutritional profile, which means that the composition should have a low content of both saturated and trans fatty acids. Furthermore it is of importance that the fat composition shows a low risk to re-crystallisation or fat blooming when used for instance in combination with enrobed  
25                   chocolate.

                  From EP-A-547.651 it is known to use in filling fats a blend of (i) a non lauric fat, in particular a mid-fraction obtained from wet fractionation of hardened soybean oil containing fat mixtures; and (ii) a liquid, trans-hardened high stability oil, in particular olein fractions obtainable from wet  
30                   fractionation of hardened soybean oil containing fat mixtures. Thereto, combinations of soybeanoil and palm oil olein are subjected to a trans-selective hydrogenation reaction. In the wet fractionation preferably acetone is used as a solvent, for the trans-selective hydrogenation a sulphided Ni-catalyst is found very suitable. The blends of mid-fractions and olein-fractions of such trans-

hydrogenated combinations give filling fats with a minimised waxiness, a steep melting curve and, a steep SFC-profile with  $N_{20} > 40\%$  and  $N_{30} < 8\%$ , and good mouthfeel. However, the trans fatty acid content of these fat composition ranges from 35 to 45%, which is too high.

5 Patent application PCT/BE02/00045 discloses a process for the production of a fat composition suitable for use as confectionery fat in confectionery fillings and creams, showing a steep SFC profile but simultaneously having a low trans fatty acid content. According to the process of PCT/BE02/00045, a fat composition containing palm oil or a palm oil fraction, the  
10 fat composition having a specific composition in terms of triglyceride and diglyceride content, is subjected to a catalytic hydrogenation, with the aim of obtaining a first fat the trans and saturated fatty acid content of which is increased to only a limited extent upon hydrogenation. The thus obtained first fat is incorporated in a fat composition. According to PCT/BE02/00045 it is possible to  
15 combine the first fat with a second fat with low trans fatty acid content. Suitable fat composition for use as second include for example a soft palm fraction or a liquid oil. Confectionery creams containing the fat composition of PCT/BE02/00045 show a good mouth feel and virtually no graininess.

## 20 1.2. Coating fats and hard centre fats.

Besides the above discussed use of confectionery fats in fillings and creams, confectionery fats of a harder type know a second important application area, namely in hard centres and in confectionery coatings and tablets. These include the so called hard butters. Hard butters are  
25 characterised by a steep SFC-profile: they have a high solid fat content and are hard at room temperature. At body temperature the hard butters melt and their solid fat content becomes negligible. These confectionery fats have a SFC profile that is similar to that of cocoa butter, which is the traditional chocolate fat. Hard centres is understood to designate confectionery centres with a firm texture, that  
30 are usually produced by extrusion.

Over the years, three main classes of hard butters have been developed for use in coatings or tablets including (i) lauric cocoa butter substitutes, (ii) cocoa butter equivalents (CBE) containing palm oil fractions combined with so-called wild fats like illipe or shea fat, and (iii) non-lauric cocoa

butter replacers (NL-CBR) based on trans-specific hydrogenated liquid oils or liquid fractions. These three classes of cocoa butter alternatives correspond to the three classes of filling fats described above.

5 In general fillings and creams will be softer than tablets and coatings. The reasons for the higher softness of fillings and creams resides in the higher fat content of these products as compared to tablets and coatings and in the softer nature of the fats contained therein, i.e. the lower SFC at room temperature. Both for filling and cream fats and for coating fats it is important to have a steep SFC-profile, which means that at room temperature the SFC  
10 should be sufficiently high, whereas at body temperature the SFC should be low, in order to avoid a "waxy" mouth feel. This explains the similar approach used in the production of filling/cream fats and the so-called hard butters.

Palm fractions used in the production of CBE are typically obtained by wet fractionation, which gives a PMF of better quality as  
15 compared to PMF obtained from dry or detergent fractionation, the wet fractionation process however being the more expensive one. The wet fractionation process guarantees a sharp fractionation, with an efficient removal of low melting triglycerides like POO (P = Palmitic acid; O = Oleic acid) and high melting triglycerides like PPP. The wet fractionation is also an efficient process for  
20 removing diglycerides from the palm mid fraction, which are to be avoided in CBE products. It is important to mention here that CBEs differ from non-lauric CBR and lauric cocoa butter substitutes in that they are a tempering type of fat, similar to natural cocoa butter. Tempering is a process step in which a molten chocolate mixture is subjected to a temperature conditioning process. In particular, in the  
25 tempering step the molten chocolate mixture is subjected to a process involving cooling and heating, with the aim of stimulating and maximising crystallisation of the fat in a stable crystalline form.

The production of non-lauric CBR is described by W. Soon in "Specialty fats versus Cocoa Butter" page 189-192. According to W. Soon,  
30 liquid oils like soybean oil, rapeseed oil and sunflower oil are suitable raw materials for a hydrogenation process, as well as liquid fractions like highly fractionated palm olein (iodine value > 68). However, according to W. Soon, care needs to be taken to carry out the hydrogenation process in such a way that production of trisaturated triglycerides (SSS where S = Saturated) is minimised, as

these have a high melting point and induce waxiness. This result may be achieved through an appropriate selection of the hydrogenation catalyst. In particular, W. Soon advises to carry out the hydrogenation reaction in the presence of a sulphur poisoned nickel catalyst as this promotes the formation of trans-isomers, which give a steep SFC-profile, formation of SSS isomers being minimised. When producing a palm oil based non-lauric CBR, it is advisable to use as a starting material a palm olein the PPP and PPO/POP content of which is as low as possible. PPP is a trisaturated fatty acid naturally present in palm oil. With PPO and POP saturation of one single fatty acid suffices to build trisaturated fatty acids.

The effect of using a sulphur poisoned Ni-catalyst in a hydrogenation reaction of palm olein in stead of a traditional non trans specific Ni-catalyst on palm olein has been described by H. Mori in "Crystallisation and polymorphism of fats and fatty acids" pg 430-431. According to Mori when using a trans specific catalyst, a confectionary fat with a sharp melting curve is obtained, which is not the case when using conventional hydrogenation catalyst.

US-A-4.205.095 relates to a method for the production of cocoa butter substitutes, according to which a palm mid fraction is subjected to a catalytic hydrogenation reaction in the presence of a nickel, platinum or palladium catalyst. The purpose of the hydrogenation reaction is to extend the possibilities of blending PMF with cacao butter by removing triglycerides containing more than one unsaturated fatty acid ( $SU_2$  and  $U_3$ ) as much as possible and by converting polyunsaturated hydrocarbon chains of the fatty acids into mono-unsaturated hydrocarbon chains, thereby reducing the iodine value to 38-45, the linoleic acid content to below 2 % and achieving a fat composition with a melting point of between 33-36°C. The cocoa butter substitutes disclosed in US-A-4.205.095 are meant to be used in chocolate products like tablets or coatings.

From US-A-3.686.240 a process is known for producing a vegetable fat product suitable for replacing at least part of cocoa butter in chocolate, the properties of the vegetable fat product being similar to those of cocoa butter. According to US-A-3.686.240 this vegetable fat product is obtained by subjecting a palm oil middle melting point fraction (PMF) to a hardening process through hydrogenation, with the aim of producing a fat which upon blending with natural cocoa butter shows full compatibility with cocoa butter,

does not soften or does not get a lower melting point. The full compatibility with cocoa butter implies that the product obtained with this process is a tempering type of fat. It is further explained that the palm mid fraction should be prepared by solvent fractionation using a specific solvent.

5 EP-A-0.536.824 solves the problem of providing a non-temper confectionery fat composition which is free of trans fatty acids. The composition consists of a (i) first fat obtained by double fractionated palm mid fraction obtained by wet fraction, containing more than 70 wt% POP triglycerides, capable of crystallisation in the Beta crystal form, and (ii) a second fat, capable of  
10 stabilising Beta prime crystals and comprising triglycerides of the SSO and/or S3-type. An example of the second fat is a PPO-rich fat obtained by enzymatic interesterification, having a PPO content of 65.5 wt. %. As the fat composition of EP-A-0.536.824 does not contain trans fatty acids, the fat composition cannot have been subjected to a partial hydrogenation.

15 The fat composition of EP-A-536.824 is a non-temper type, which follows from the comparison of the SFC-values at 30°C of the fat composition which has not been subjected to a stabilisation process, with a fat composition that has been subjected to a stabilisation (tempering) step. It is claimed that the ratio of both SFC values should be below 4, preferably below 3,  
20 the examples giving fat compositions of which the SFC ratio ranges from 1.7 to 3.2. The application of these fat compositions in confectionery coating recipes containing no cocoa mass, having a cocoabutter/fat blend ratio of 5/95 is demonstrated. In the preparation of the fat compositions of EP 0 536 824, no hydrogenation step is involved.

25 The fat composition obtainable with the process of PCT/BE02/00045, which is low in trans fatty acids, proofed to be very suitable for use in for example hard centres and confectionery coatings and tablets.

### 1.3. Caramel.

30 A third kind of application of fats in the confectionery area is their use in caramel. Caramel is understood to include both high boiling and soft caramels. Fats give a certain consistency to the caramel, they control chewiness and reduce stickiness. In caramels, traditionally hydrogenated liquid oils such as hydrogenated soybean oil or hydrogenated rapeseed oil are used. In

stead of these oils, lauric fats like hydrogenated palm kernel or hydrogenated coconut oil can be used as well. Because of the too high content of trans fatty acids or saturated fatty acids of the conventionally used hydrogenated oils, there is a need for alternatives having a low trans fatty acid content, which show a melting profile similar to the conventionally used oils and which may be produced at an acceptable cost for this application.

The process of PCT/BE02/00045 proofed to be suitable for the production of fats for use in caramels.

10

## 2. OBJECT OF THE INVENTION.

15

It is an object of the present invention to provide a fat composition for use as a confectionery fat, which is characterised by a steep SFC-profile, which has an interesting nutritional profile, i.e. has a low content of trans fatty acids and a sufficiently low content of saturated fatty acids, a high crystallisation rate and which shows a reduced tendency to re-crystallisation or fat blooming.

20

Another object of this invention is to provide a fat composition which is suitable for use in fillings and in creams, and also in caramel with the aim of replacing therein fats containing high levels of trans fatty acids or saturated fatty acids.

25

It is a further object of the present invention to provide a fat composition which is suitable for use in confectionery centres, confectionery coatings and tablets, the fat composition being suitable to fully or partially replace fats with a high trans fatty acid content, while maintaining a steep SFC-profile, whereby the confectionery product can be prepared without necessitating tempering step.

30

Thereby it is important that the fat composition can be prepared starting from a fat which does not require extensive and expensive fractionation processes to render it suitable for use in the above mentioned applications.

### 3. DESCRIPTION OF THE INVENTION.

It has now been found with the present invention that a fat composition suitable for use as confectionery fat can be obtained by subjecting a starting fat composition to a catalytic hydrogenation reaction as described in the characterising part of the first claim.

The starting fat composition is characterised :

(1) by a glyceride composition with:

- A  $S_2U$  content between 30 and 80 wt. %, preferably between 40 and 70 wt. %, most preferably between 45 and 65 wt. %,
- A  $SU_2 + U_3$  content of below 60 wt. %, preferably between 10 and 50 wt. %, most preferably between 20 and 40 wt. %,
- A  $S_3$  content of below 20 wt. %, preferably less than 15 wt. %, most preferably less than 10 wt. %
- A diglyceride content between 3 and 12 wt. %,

the glyceride contents being expressed as wt. % with respect to the total amount of di-and triglycerides.

(2) in that the starting fat composition contains an amount of an interesterified fat, in particular between 10 to 100 wt. % of interesterified fat, preferably 20 to 80 wt. %, most preferably 30 to 70 wt. %. The amounts of interesterified fat are expressed as wt. % with respect to the total amount of starting fat

The starting fat composition is subjected to a catalytic hydrogenation until a hydrogenated first fat is obtained which is characterised by a trans fatty acid (TFA) content of less than 25 wt. %, preferably less than 20 wt. %, more preferably less than 10 wt. % with respect to the total fat content. The hydrogenated first fat is incorporated in the fat composition. The amount of the first fat incorporated in the fat composition may vary within wide ranges and may even be 100 wt%.

In the above, S means saturated fatty acid with a hydrocarbon chain length of 14-24 carbon atoms, and U means unsaturated fatty acid with a hydrocarbon chain length of 14-24 carbon atoms.

The starting fat composition preferably comprises palm oil or a fraction thereof, obtained by dry fractionation or even detergent fractionation if so desired. The starting fat composition may if so desired however also comprise other fats.

The inventor has now found that the incorporation in the starting fat composition of an amount of interesterified fat and the subjecting of this starting fat composition to a hydrogenation, results in a fat having an improved resistance against fat bloom and re-crystallisation, while all other desirable properties, i.e. the presence of a steep SFC-profile, an interesting nutritional profile, i.e. a low content of trans fatty acids and a sufficiently low content of saturated fatty acids as well as a high crystallisation rate, are maintained.

The inventor has found that by incorporation of the fat composition obtainable with the process of this invention in the above described products, storage stability and shelf life may even be improved. Indeed, certain re-crystallisation and fat bloom phenomena can be retarded by several weeks or months, meaning an increased value for the final end product.

Another advantage of the current invention is that a higher amount of the low-trans first fat can be incorporated in the final fat composition as compared to the composition disclosed in PCT/BE02/00045, thus improving the economic feasibility of this fat.

A number of applications exist where the risk to the occurrence of fat re-crystallisation and bloom is rather high. This is mostly the case in recipes using a higher amount of cocoa-butter where the composition is not tempered and risks to re-crystallise, for example in confectionery coatings containing some cocoa mass besides defatted cocoa powder. The cocoa mass is added in order to increase the chocolate taste. This is also the case in recipes containing a higher amount of liquid oil where there is a risk to fat migration and re-crystallisation. An example of such recipe is a confectionery filling containing a high amount of nut paste, which contain a high amount of free liquid oil. The liquid oil acts as a transport medium for other fat components to migrate to the surface, where re-crystallisation can take place and visible crystals or crystals are formed, which during tasting are evaluated as a kind of graininess.

Furthermore, a fat composition showing the above described properties can be obtained without involving the need to use as a starting fat a fat component which has been subjected to expensive solvent fractionation processes and contains highly concentrated levels of POP or PPO triglycerides, to obtain a fat showing the optimum hardness for use in coatings or



hard centres or in confectionery products containing high amounts of liquid oils, for example with high amounts of hazelnut paste.

The fats obtainable with the present invention can be further distinguished from the known processes, in that they have an improved  
5 crystallisation rate, which is important as it determines the capacity of confectionery production lines and the energy needed to cool down and solidify end products before being packed.

The interesterified fat may be a single fat or a mixture of two or more interesterified fats.

10 In the present invention it is preferred to use an interesterified fat with a C-12 content of less than 3 wt. %, most preferably less than 1.5 wt. %. This means that it is preferred to use a non-lauric interesterified fat, in view of reducing the risk to the development of so-called soapy flavour. This is also done to reduce the risk to the occurrence of eutectic effects when using the  
15 fat composition in combination with non-lauric fats, in particular in applications having a hard texture, for instance tablets or coatings.

Suitable interesterified fats for use with the starting fat of the present invention are fats containing palm or palm fractions. Examples of  
20 suitable fats include interesterified palm, interesterified palm stearin or olein, or mixtures containing of two or more of these products. These fats are non-lauric and their raw materials are widely available. Furthermore, as these fats contain an interesting amount of solid fat, the extent to which the starting fat needs to be hydrogenated to obtain the desired SFC-profile may be limited, as a consequence of which the risk to the building of trans fatty acids is limited.

25 When it is desired to increase the sharpness of the SFC-profile and to further improve the mouth feel of the product, the first fat may be subjected to a further fractionation, after the hydrogenation reaction has been terminated. This can be particularly useful when producing fats for application in coatings and tablets, as fractionation allows increasing snap and reducing  
30 waxiness.

In a preferred embodiment of the process for producing a fat with a sharp SFC-profile and a particularly low TFA-content, use is made of a starting fat composition containing an amount of a fractionated interesterified fat, in particular a fat that has been fractionated after

interesterification. The amount of this fractionated fat incorporated into the starting fat composition will mostly range from 10 to 100 wt. % expressed on the total amount of interesterified fat present in the starting fat composition. The hydrogenation is carried out in such a way that the first fat obtained contains less than 8 wt. %, preferably less than 6.5 wt. %, most preferably less than 5 wt. % of trans fatty acids. Fractionation removes the fat components having a too high and too low melting point and in that way renders the SFC profile steeper. This steeper effect could also be obtained through hydrogenation, hydrogenation however entailing the risk to an increased content of trans fatty acids.

The first fat obtained with the above described process can be mixed with another fat, having a sharp SFC profile and a low trans fatty acid (TFA) content, so as to obtain a final fat composition with a TFA-content of less than 8 wt. %, preferably less than 6.5 wt. %, most preferably less than 5 wt. %. The second fat can for instance be a fat prepared according to PCT/BE02/00045. It was found that the thus obtained fat compositions show a steep SFC-profile which is particularly useful for confectionery coatings, a low TFA-content and a very good stability without necessitating tempering. These fat compositions can be obtained without necessitating the use of a highly fractionated and expensive fat composition containing over 70 wt. % of POP in view of providing the desired SFC profile.

The first fat obtainable with the process of this invention is preferably characterised by an SFC at 20°C of at least 35 wt. %, preferably at least 50 wt. %, most preferably at least 60 wt. %. High SFC's at 20 °C are particularly desirable when using the first fat as such in tablets or coatings but also in fillings or creams containing a high amount of liquid oil where it is preferred that the first fat has a sufficiently high solid fat content so as to obtain a filling having a sufficiently hard texture.

The first fat is preferably a non temper fat. When using this fat either pure, in combination with other non-temper fats or in combination with a limited amount of temper type fat, stable products can be made without necessitating a tempering step in the manufacturing process, which is an important simplification.

In view of the envisaged properties of the end product, the man skilled in the art may use a fat composition obtainable with the above described method containing exclusively the first fat, or in other words containing 100 wt. % of the first fat. However, the man skilled in the art may as well blend the first fat with an amount of a second fat. Thereto, 10-100 wt. % of the first fat may be blended with 90-0 wt. % of a second fat. The second fat preferably has a C-12 content of less than 5 wt. %, most preferably less than 3 wt. %. To limit this C-12 content, the second fat is preferably substantially free of lauric components.

The second fat preferably contains an amount of a hydrogenated fat or an interesterified fat as these will generally show a good compatibility with the first fat.

To limit the trans fatty acid content of the final fat composition when using a mixture of the first fat with a second fat, it is preferred to use as a second fat a fat having a limited trans fatty acid content. In particular it is preferred that the second fat contains less than 15 wt. %, preferably less than 10 wt. %, most preferably less than 7.5 wt. % of trans fatty acids.

Very suitable fats for use as second fat are fats containing 70 wt. % or more of palm oil or palm oil fractions, or a mixture thereof. Examples of such fats are hydrogenated palm or hydrogenated palm olein, interesterified palm, interesterified palm oil fractions, which may be further fractionated after interesterification or hydrogenation or not, as these are fats with sufficient solid parts to give enough structure to the final fat composition, without giving high trans fatty acid levels.

An additional advantage of the fats obtainable with the present invention is their high crystallisation rate. This is an important parameter since it is linked to the capacity of confectionery production lines and the energy needed to cool down and solidify the products before being packed. Fat compositions obtainable with this process are characterised by a crystallisation time at 15°C of less than 15', preferably less than 10' to reach 50% of the SFC measured at 15°C according to IUPAC method 2.150a.

The present invention further relates to the use of fat compositions obtainable with the above described process, and the use of the above described fat compositions in the preparation of confectionery products.

The invention also relates to confectionery products containing the fat composition obtainable with the above described process, or containing a fat composition as described above. In particular it concerns confectionery products belonging to the group of fillings, creams, hard centres or caramel, or products like confectionery coatings or tablets.

The present invention is further elucidated in the examples and comparative examples given below.

#### Examples

##### Comparative example A.

A palm oil was dry fractionated so as to obtain a palm mid fraction (PMF) with an IV of 42. Other characteristics of this PMF are given in table 1. The thus obtained PMF was subjected to a catalytic hydrogenation, in the presence of a Ni catalyst type Pricat 9910 until a product was obtained with the characteristics of sample 1 summarised in table 1.

Table 1.

Product	PMF	Sample 1
<b>IV</b>	42,0	38,6
<b>FAC</b>		
C12	0,26	0,28
C14	1,01	1,05
C16	50,25	50,23
C18	5,14	5,66
C18-1	37,19	40,19
C18-2	5,11	1,86
C18-3	0,00	0,00
C 20	0,43	0,37
<b>TFA</b>	0,71	7,71
<b>SFA</b>	57,21	57,71
<b>TFA+SFA</b>	57,92	65,42
<b>Triglycerides</b>		
S2U	69,51	
SU2+U3	18,57	
S3	1,29	
<b>Diglycerides</b>	8,85	
<b>SFC</b>		
10°C	76,9	88,9
20°C	46,5	71,1
25°C	8,4	49,1
30°C	0,0	25,3
35°C	0,0	11,3

5

Example 1.

A fat composition was prepared by

- (1) In a first step, mixing 60 wt. % of a PMF of comparative example A with 40 wt. % of random interesterified palm
- (2) followed by a second step of subjecting this mixture to a catalytic hydrogenation, using a catalyst type Pricat 9910 (available from Syntex), a non-trans specific Ni catalyst.

The hydrogenation was continued until a product was obtained having the characteristics given in table 2, sample 2. The characteristics of the composition before hydrogenation are given in table 2 as Initial Fat Composition.

15

The Initial Fat Composition was too soft to be fit for use in confectionery coatings or filling recipes containing high amounts of liquid oil, and had a too slow crystallisation rate. As will become apparent from the examples given below, the problem of the too slow crystallisation rate can be overcome by subjecting the Initial Fat Composition to a slight hydrogenation, during which only a limited amount of TFA is built and the amount of saturated fatty acids is increased to only a minor extent. A particular advantage of the Initial Fat Composition is that it does not require the use of expensive fractionation processes, e.g. wet fractionation to render it suitable for use in confectionery products.

Table 2.

Product	Initial Fat Composition	Sample 2.	Sample 3
<b>IV</b>	46,6	40,2	43,4
<b>FAC</b>			
C12	0,48	0,55	0,32
C14	1,24	1,34	1,03
C16	49,35	50,30	43,04
C18	4,49	4,89	6,07
C18-1	36,09	40,95	47,53
C18-2	7,41	1,13	1,09
C18-3	0,03	0,00	0
C 20	0,39	0,28	0,38
<b>TFA</b>	0,94	8,38	14,51
<b>SFA</b>	56,06	57,47	50,94
<b>TFA+SFA</b>	57,0	65,85	65,45
<b>Triglycerides</b>			
S2U	56,58		
SU2+U3	29,59		
S3	4,92		
<b>Diglycerides</b>	8,58		
<b>SFC</b>			
10°C	69,0	87,5	86,0
15°C	57,7	78,6	76,4
20°C	39,3	65,4	62,8
25°C	18,2	45,9	46,3
30°C	8,2	27,1	29,7
35°C	3,5	14,3	16,6
<b>Crystallisation rate at 15°C (*)</b>			
2,5 minutes	18,5%	30,1%	42,5%
5 minutes	20,4%	47,3%	61,8%
7,5 minutes	21,1%	60,1%	71,1%
10 minutes	23,6%	68,7%	75,9%
15 minutes	36,0%	79,1%	81,8%

- 5 (\*) SFC measured after a certain crystallisation time expressed as % of the SFC at 15°C measured according to IUPAC method 2.150a. The starting fat is completely molten at 80°C and is then put in a water bath at 15°C. From there on time registration starts.

Example 2.

A sample (sample 3) was prepared by blending 50 wt. % of a first fat, obtained by hydrogenating the Initial Fat Composition of Example 1, with a catalyst type Pricat 9910 to an IV of 39.1, with 50 wt. % of a second fat.

The second fat was obtained by hydrogenating a single fractionated palm olein, with an IV value of 56.6 in the presence of a catalyst type Pricat 9910, until a product was obtained with an IV of 48.1.

The characteristics of sample 3 are given in table 2.

Example 3.

Confectionery coatings were prepared using the fat composition of respectively comparative sample 1, and sample 2 and sample 3 according to the invention.

The recipe used for preparing these coatings is summarised in table 3. The coatings were prepared by first melting the fat composition of the comparative example, sample 2 or sample 3 and adding 1 wt. % of sorbitan tristearate. All ingredients, except part of the fat, were mixed and roll refined. After roll refining the mixed ingredients were further homogenised with the rest of the fat in a mixer with heated jacket at a temperature of 40°C.

Table 3.

<u>Coating Recipe</u>	%
Fat	29,2
Sugar	44,7
Cocoapowder 10/12	20,6
Cocoa Mass	5,1
Lecithine	0,4
Vanilline	0,05
Cocoa butter on total fat	14,8



With this coating mixture, tablets were moulded at a temperature of 45°C, whereafter the tablets were cooled for 30' at 5°C and thereafter for 30' at 15°C, following which the tablets were de-moulded. No tempering was applied. The tablets were stored in an incubator for 1 week at 20°C.

The bloom resistance of the tablets was tested by storing in incubators at different temperatures. Thereto, a first incubator was cycled in cycles of 12 hours between a temperature of respectively 15-25 °C, a second incubator was left at a temperature of 25 °C, a third one was maintained at a constant temperature of 28°C.

The results of these bloom tests are given in table 4. Scores are given from "no", indicating "no bloom" to "++++", indicating very "strong blooming"

From the results given in table 4 it can be seen that coatings containing an important amount of cocoa-butter, tend to bloom earlier when containing a fat composition of the type of sample 1 as compared to fats of samples 2 and 3. Samples 2 and 3 are both fats which contain an amount of an interesterified fat and are produced according to the process of the present invention, with the objective of improving bloom resistance.

Table 4.

Weeks	15-25 °C			25 °C			28 °C		
	sample 1	sample 2	sample 3	sample 1	sample 2	sample 3	sample 1	sample 2	sample 3
1	no	no	no	no	no	no	no	no	no
2	+/-	no	no	+/-	no	no	+/-	no	no
3	++	+	+/-	+	no	no	+/-	no	no
4	++	+	+	++	no	no	+	no	no
5	++	+	+	++	no	no	+	no	no
6	+++	++	++	+++	no	no	++	no	no
7	+++	++	++	+++	no	no	++	no	no
8	+++	++	+++	+++	no	no	++	no	no
9	+++	++	+++	+++	no	no	++	no	no
10	+++	++	+++	+++	no	no	++	no	no
12	+++	++	+++	+++	no	no	++	no	no
14	+++	++	+++	+++	no	no	++	no	no
16	++++	+++	+++	+++	no	+/-	++	no	no
18	++++	++++	++++	+++	no	+	++	no	no
20	++++	++++	++++	+++	no	+	++	no	no

Example 4.

5 The samples of example 3 were used to prepare a filling containing a high amount of liquid oil, originating from hazelnut paste. The recipe of the filling is given in table 5.

Table 5.

<u>Filling Recipe</u>	%
Fat	23
Sugar	40
Cocoa Mass	5
Hazelnut paste	25
Skimmed milk powder	6,6
Lecithine	0,4
10 Vanilline	0,05

15 The fillings were prepared as follows : all ingredients, except the fat were mixed and roll refined. Thereafter, the mixture was further homogenised with the molten fat in a mixer with heated jacket at a temperature of 40°C. After homogenisation the mass was cooled to 35°C and poured into aluminium cups with a diameter of 28 mm and a height of 20 mm. The thus obtained fillings were cooled for 30' at 5°C, followed by 30' at 15°C.

20 The fillings were then stored at 20°C and weekly checked on the appearance of crystals at the surface, which would indicate migration of a fat component or re-crystallisation. The results of this test are given in table 6. In this table 6 "no" indicates no crystals at the surface, "+" means visible crystals at the surface.

25 From the results given in table 6 it can be concluded that samples 2 and 3 show a better resistance against migration and re-crystallisation as compared to the comparative example sample nr 1.

Table 6.

Week	sample 1	sample 2	sample 3
1	no	no	no
2	no	no	no
3	no	no	no
4	no	no	no
5	no	no	no
6	+	no	no
7	+	no	no
8	+	no	no
9	+	no	no
10	+	no	no
12	+	no	no
14	+	no	no
16	+	no	no

5

Example 5.

A fat A was prepared by hydrogenation of the PMF of comparative example A with an IV of 42.0 and a POP-content of 40.9 %, using a catalyst Pricat 9910, until a product was obtained with IV of 40.1 and a fatty acid composition as described in table 7.

10

A fat B was prepared by first interesterifying a palm oil followed by fractionation until a fat was obtained with IV 44.1 and a composition described in table 7 as "initial fat B", and then hydrogenating this fat, using a catalyst Pricat 9910, until a product was obtained with IV of 37.6 and a fatty acid composition as described in table 7. Initial fat B had a PPO content of 26.9 wt. %.

15

A coating fat sample (sample 4) was then prepared by combining 60% of fat A and 40% of fat B. This sample 4 had characteristics described in table 7. As can be seen the TFA content of sample 4 is very limited (6.69%) while the SFC-profile is steeper than for example fat sample nr 2. Sample 4 is also characterised by a quick crystallisation rate as can be seen from table 7.

20

The solid fat content (SFC) of sample 4 was measured at 30°C according to IUPAC method 2.150a (non-stabilised) and IUPAC method 2.150b (stabilised). The ratio between the 2 SFC results was only 1.24, indicating that fat sample 4 can be used in applications without a tempering step being necessary.

25

table 7

Product	Initial fat A	Fat A	Initial fat B	Fat B	Sample 4
<b>IV</b>	42,0	40,1	44,1	37,6	39,1
<b>FAC</b>					
C12	0,26	0,33	0,44	0,38	0,35
C14	1,01	1,13	1,10	1,16	1,14
C16	50,25	50,50	50,87	50,68	50,57
C18	5,14	5,30	5,14	5,38	5,33
C18-1	37,19	39,65	34,24	39,95	39,77
C18-2	5,11	2,32	7,20	0,92	1,76
C18-3	0,00	0,00	0,00	0	0
C 20	0,43	0,31	0,41	0,41	0,35
<b>TFA</b>	0,71	6,58	0,91	6,86	6,69
<b>SFA</b>	57,21	57,57	57,96	58,00	57,74
<b>TFA+SFA</b>	57,92	64,15	58,87	64,85	64,43
<b>Triglycerides</b>					
S2U	69,51		59,77		
SU2+U3	18,57		23,00		
S3	1,29		6,97		
<b>Diglycerides</b>	8,85		5,39		
<b>SFC</b>					
10°C					88,4
15°C					79,5
20°C					67,6
25°C					46,5
30°C					24,4
35°C					10,9
<b>Crystallisation rate at 15°C</b>					
2,5'					26,1%
5'					41,0%
7,5'					53,8%
10'					63,2%
15'					76,0%

Example 6.

5 A confectionery coating was prepared with fat nr 4,  
according to the recipe in table 3, using the same procedure as described in  
example 3.

Also here we added 1 % of sorbitan tristearate to the  
fat.

10 Tablets were stored for 1 week at 20°C and then  
evaluated. The tablets were glossy and had good eating properties, meaning nice  
melting in the mouth without leaving a feeling of waxiness.

CLAIMS.

1. A process for the production of a fat composition, suitable for use as a confectionery fat, characterised in that a starting fat composition having the following glyceride composition :

- a  $S_2U$  content of 30 - 80 wt. %, preferably 40 - 70 wt. %, most preferably 45 - 65 wt. %
- a  $SU_2 + U_3$  content less than 60 wt. %, preferably 10 - 50 wt. %, most preferably 20 - 40 wt. %,
  - a  $S_3$  content less than 20 wt. %, preferably less than 15 wt. %, most preferably less than 10 wt. %
  - a diglyceride content of 3 - 12 wt. %
  - the starting fat composition containing between 10 and 100 wt. %, preferably 20 and 80 wt. %, most preferably between 30 and 70 wt. % of an interesterified fat,

is subjected to a catalytic hydrogenation so as to obtain a first fat with a trans fatty acid content of less than 25 wt%, preferably less than 20 wt%, most preferably less than 10 wt%, and in that the first fat is incorporated in the fat composition, the glyceride content being expressed as wt. % with respect to the total amount of di- and triglycerides, in which S means a saturated fatty acid with a hydrocarbon chain length of 14-24 carbon atoms, U means unsaturated fatty acid with a hydrocarbon chain length of 14-24 carbon atoms.

2. A process according to claim 1, characterised in that the starting fat composition comprises palm oil or a fraction thereof.

3. A process according to claim 1 or 2, characterised in that the interesterified fat contains less than 3 wt. %, preferably less than 1.5 wt. % of C12 fatty acid.

4. A process according to any one of claims 1 - 3, characterised in that the interesterified fat contains palm oil or a palm oil fraction.

5. A process according to any one of claims 1 - 4, characterised in that the first fat is subjected to a fractionation process after termination of the hydrogenation reaction.

6. A process according to any one of claims 1 - 5, characterised in that the interesterified fat contains an amount of fractionated interesterified fat which ranges between 10 and 100 wt. % with respect to the total amount of interesterified part, and in that the first fat obtained after hydrogenation  
5 contains less than 8 wt. %, preferably less than 6.5 wt. %, most preferably less than 5 wt. % of trans fatty acids.

7. A process according claim 6, characterised in that the first fat is incorporated in a fat composition, the fat composition having a trans fatty acid content of less than 8 wt. %, preferably less than 6.5 wt. %, most  
10 preferably less than 5 wt. %.

8. A process as claimed in any one of claims 1-7, characterised in that 10-100 wt. % of the first fat is mixed with 90-0 wt. % of a second fat, the second fat having a C12 fatty acid content of less than 5 wt. %, preferably less than 3 wt. %.

9. A fat composition obtainable with the method of any one of the claims 1-8, characterised in that the composition has an SFC at 20°C of at least 35 wt. %, preferably at least 50 wt. %, most preferably at least 60 wt. %.

10. A fat composition as claimed in claim 9, characterised in that the fat composition is a non temper fat.

11. A fat composition as claimed in claim 9 or 10, characterised in that the composition contains 10-100 wt. % of the first fat and 90 - 0 wt. % of a second fat, the second fat having a C-12 fatty acid content of less than 5 wt. %, preferably less than 3 wt. %.

12. A fat composition as claimed in claim 11, characterised in that in that the second fat contains a hydrogenated or an interesterified fat.

13. A fat composition as claimed in claim 11 or 12, characterised in that in that the second fat contains less than 15 wt. %, preferably less than 10 wt. %, most preferably less than 7.5 wt. % of trans fatty acids.

14. A fat composition as claimed in any one of claims 11-13, characterised in that the second fat contains at least 70% wt. of palm oil, one or more palm oil fractions, interesterified palm oil, interesterified palm

oil fractions or one or more fractions of the afore mentioned fats or a mixture of two or more of the afore mentioned fats.

5 15. A fat composition as claimed in any one of claims 9-14, characterised in that the fat composition has a crystallisation time at 15°C of less than 15 minutes, preferably less than 10 minutes to reach 50% of its SFC measured at 15°C.

10 16. Use of the fat composition obtainable with the process of any one of claims 1-8 or a fat composition according to any one of claims 9 – 15 for the preparation of a confectionery product.

17. A confectionery product containing the fat composition obtainable with the process of any one of claims 1-8, or a fat composition according to any one of claims 9-15.

15 18. A confectionery product as claimed in claim 17, characterised in that the confectionery product is selected from the group of a filling, a cream, a hard centre or caramel.

19. A confectionery product as claimed in claim 17, characterised in that the confectionery product is a coating or a tablet.

20



## ABSTRACT.

**Low-trans fats for confectionery fat compositions.**

The present invention relates to a process for the production of a fat composition, suitable for use as a confectionery fat. According to this invention a starting fat composition having the following glyceride composition :

- a  $S_2U$  content of 30 - 80 wt. %, preferably 40 - 70 wt. %, most preferably 45 - 65 wt. %
- a  $SU_2 + U_3$  content less than 60 wt. %, preferably 10 - 50 wt. %, most preferably 20 - 40 wt. %,
- a  $S_3$  content less than 20 wt. %, preferably less than 15 wt. %, most preferably less than 10 wt. %
- a diglyceride content of 3 - 12 wt. %
- the starting fat composition containing between 10 and 100 wt. %, preferably 20 and 80 wt. %, most preferably between 30 and 70wt. % of an interesterified fat,

is subjected to a catalytic hydrogenation so as to obtain a first fat with a trans fatty acid content of less than 25 wt%, preferably less than 20 wt%, most preferably less than 10 wt%. The thus obtained first fat is incorporated in the fat composition.

The glyceride content is expressed as wt. % with respect to the total amount of di- and triglycerides, S means a saturated fatty acid with a hydrocarbon chain length of 14-24 carbon atoms, U means unsaturated fatty acid with a hydrocarbon chain length of 14-24 carbon atoms.

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